

Chapter 5

5. CONCLUSION & RECOMMENDATION :-

5.1 CONCLUSION:-

A municipality applying this best practice will benefit through reduced water loss and reduced costs to the utility. The importance of prioritizing active leak control practices and procedures in the identification of water loss and the corresponding strategies to reduce leakage cannot be understated. The municipality will also benefit through the extension of sustainable water supplies, reduced operating costs, improved system hydraulics and utility efficiency, and improved environmental stewardship. This methodology will also allow more rational performance measures to be calculated for sub-systems, systems and utilities for realistic national and international performance comparisons of water loss management.

Water is one of the most important basic needs for all living beings. However, unfortunately a huge amount of water is being wasted by uncontrolled use. Some other automated water pressure monitoring system is also offered so far but most of the method has some shortness in practice. Try to overcome these problems and implemented an efficient automated water losses monitoring and controlling system. Our intension of this research work was to establish a flexible, economical and easy configurable system, which can solve our water-losing problem. Had been used a low cost **atemga32** microcontroller and **MPX4115A** pressure sensor in this system which is the key point to reduce cost. For successfully simulation the system in lab and therefore proposed a water losses monitoring and controlling network which flexibility would offer

us to control this system from any place via wireless even with different type of devices. This could have a substantial benefit from this research work for efficient management of water losses.

The measurement of water losses should play a measure of 0 to 100 kpa, but the system developed is possible to measure up to 115 kpa. Another part of The static pressure of water is approximately one Kilopascal (kPa) per, so the pressure range is 0 to 115KPa, which corresponds to the range of the MPX4115A pressure sensor. Those have been obtained from the simulation system in chapter four.

Therefore controlling water losses or leak by mitigating used automatic control unite (microcontroller, pressure sensor) compare with manual control system used(Taco meter) or Pressure control valve(PCV). It is hoped that it will be a catalyst for increased and enhanced awareness and implementation of water loss solutions in the country.

5.2 RECOMMENDATION

- 1) In the circuit can be increase the numbers of sensors .
- 2) This circuit can be developing by using other device .
- 3) This circuit can be in hole of water distribution in country .
- 4) Also in circuit can use FSK module for send the data.
- 5) The range of pressure sensor can be increase by using other advance types of sensor.

REFERENCES

[1] IWA (International Water Association), 2001. *Standard Components of Water Balance for Transmission or Distribution Systems*.

[2] Microcontroller chip Technology, 2001, Atmega32, Datasheet www.microchip.com access time (07/06/2013 18:45).

[3] Thorton, Julian, 2002, *Water Loss Control Manual. First edition*. McGraw-Hill. New York, NY. Tooms and Pilcher, 2006.

[4] Waldron T.(2005) *Managing and reducing losses from water distribution systems*.Manual 10, Executive Summary. ISBN 0 7242 9498 8

[5] AWWA, 1999, *American Water Works Association Manual M36* , “Water Audits and Leak Detection”.

[6] *The Manual of Water Supply Practices*, AWWA, Denver.AWWA, 2003, *Applying Worldwide BMP's in Water Loss Control* , AWWA Water Loss Control Committee.

[7] Lambert, A., Hirner W., 2000, *Losses From Water Supply Systems; Standard Terminology and Recommended Performance measures*, International Water Association.

[8] Tooms, S., and Pilcher, R. (2006) “*Practical Guidelines on Efficient Water Loss Management*”, *Water Supply*, August, 47.

[9] Farley, M., and Trow, s. (2003) “*Losses in Water Distribution Networks: A Practitioner's*.

[10] *Guide to Assessment, Monitoring and Control*”, IWA Publishing, Alliance House, 12 Caxton St., London, UK.

[11] Statistical Department of Turkey (TUIK), (2003) *Statistical Department of Turkey Water*.

[12] *Statistics, In Turkish, Unpublished Kleiner, Y. (1997) “Water Distribution Network Rehabilitation: Selection and Scheduling of Pipe Rehabilitation Alternatives”, PhD Thesis, University of Toronto, Toronto, Canada.*

[13] *Lambert, A.O., Brown, T.G., Takizawa, M., and Weimer, D. (1999) “A Review of Performance Indicators for Real Losses from Water Supply System”, J. Water SRTAqua, 48:6, 227-237.*

[14] data sheet, <http://www.atmel.com/avr>(time 18:30 -15/06/2013, 3.1advanced microelectronics(Series Editors: K. Itoh T. Lee T. Sakurai W. M. C. Sansen D. Schmitt-Landsiedel) Springer Berlin Heidelberg 2005 Printed in Germany.

[15]<http://www.futureelectronics.com/en/amplifiers/differential-output.aspx>(time 16:45- 19/05/2013), data sheet, *Sensor Systems and Applications Engineering* by: Ador Reodique.(AN1636 Rev 2, 10/2007).

[16] *Sensor Technology Handbook* by(Editor-in-Chief Jon S. Wilson 2005).

[17] *K. Seki, H. Yokoi & M. Iwasaki, Experimental evaluations of friction behavior in micro-displacement region positioning for servo motor with air bearings, Proceeding of IEEE International Conference on Advanced Intelligent Mechatronics, 2012.*

[18] *B. Li, L. Gao & G. Yang, Evaluation and compensation of steady gas flow force on the high pressure electro-pneumatic servo valve direct-driven by voice coil motor, Energy Conversion and Management 67: 92–102, 2013.*

[19] *K. N. D. Perera, S. R. M. Fernando, R. A. D. S Ranasinghe, A. U.S. & Ranathunga, P. K. Jayawardena, Computer controlled DC servo motor, Working paper, pp1-3, 2003.*

[20] *R. Wai, & R. Muthusamy, Fuzzy-Neural-Network Inherited Sliding-Mode Control for Robot[2007].*

[21] *Manipulator Including Actuator Dynamics, IEEE Transactions on Neural Networks and Learning Systems, Vol. 24, NO. 2, 2013.*

[22] *Torque control approach for PMSM motor, J. Electrical Systems 8-2: 236-248, 2012.*

[23] *A. Sadeghieh, H. Sazgar, K. Goodarzi & C. Lucas, Identification and real-time position control of a servo-hydraulic rotary actuator by means of a neurobiologically motivated algorithm, ISA Transactions 51:208–219,2012.*

[24] *N. Yang, D. Li, J. Zhang & Y. Xi, Model predictive controller design and implementation on FPGA with application to motor servo system, Control Engineering Practice 20 : 1229–1235, 2012.*

[25] *N. Truong & D. Vu, “Hardware-in-the-Loop approach to the development and validation of precision induction motor servo drive using xPC Target” Proceeding of Ninth International IEEE conference on Computer Science and Software Engineering, 1-5, 2012.*

[26] *L. Hongda1 & L. Fengxiang, experiment and Matlab simulation of electric power steering systembased on permanent magnet ac servo motor, Proceeding of IEEE International Conference on Computer Science and Network Technology, 1-4, 2011.*

[27] *S. Sharp, A. Wicks, A. Ordys & G. Collier, Modelling of a Pan and Tilt Servo System, Proceeding of IEEE International Conference on Control, 1-5, 2012.*

[28] *L. Xiaosheng, W. Yuqiang, H. Nantian & H. Yue, The Networked Virtual Test System for Servo Motor and Drive Based on LabVIEW, Proceeding IEEE 7th international conference on Power Electronics and Motion Control, 1-5, 2012.*

[29] *A. Mehmet, & T. Ismail, Motion controller design for the speed control of DC servo motor, International Journal of Applied Mathematics And Informatics, Volume 1.(4):131-137, 2007.*

[30] [www.electrosome.com\(time\)](http://www.electrosome.com/time) 15:30 pm 15/07/2013]